

The Examiner has rejected claims 7, 8 and 23 under 35 U.S.C. 112 for the reasons stated in the office action. It is submitted that this ground of rejection has been overcome by the instant amendment. Claims 7 and 8 have been amended to correct the claim from which they are intended to depend. Claims 11 and 23 have been amended to correct typographical errors.

The Examiner has rejected claims 24 and 26 under 35 U.S.C. 102(b) or in the alternative 35 U.S.C. 103(a) over Rhoda et al. Claim 24 has been canceled. It is respectfully asserted that this ground of rejection for claim 26 is not well taken. The invention provides a composition and process for electroless plating of a platinum-rhodium alloy onto substrates. The claimed composition comprises an aqueous solution of a water soluble, platinum nitrite salt or platinum amine-nitrite salt; a water soluble rhodium nitrite salt or rhodium amine-nitrite salt; ammonium hydroxide as a complexing agent; and hydrazine hydrate as a reducing agent. The claimed plating process utilizing the claimed plating composition is autocatalytic and deposits high purity platinum-rhodium alloy coatings on substrates if virtually any material and of any geometrical shape. The composition of this aqueous solution is essentially free of sulfur, phosphorus, chlorine and non-volatile components that cause impure plating, allowing for improved appearance and properties of the plated alloy. Further, the process generates essentially no hazardous substances and the absence of non-volatile components avoids the accumulation of byproducts that degrade the plating bath, allowing for virtually unlimited replenishment of the bath. Also, the composition of the plating bath allows metallic rhodium and platinum to be precipitated from the bath by boiling without undesirable contaminants.

Rhoda et al. disclose a bath and process for non-electrolytic deposition of platinum and platinum alloys onto a substrate. The bath disclosed may comprise an aqueous solution of an alkaline platinum IV hydroxide, hydrazine and sodium or optionally ammonium hydroxide. A rhodium salt, particularly ammonium rhodium III chloride, rhodium III nitrate, diammonium sodium rhodium III chloride or ammonium rhodium III nitrite may be added to the bath to plate a platinum-rhodium alloy onto a substrate. As the examiner appreciates, *Rhoda et al. do not disclose either a water soluble, platinum nitrite salt or platinum amine-nitrite salt.* With regard to the dependent claims, the rhodium salts disclosed by Rhoda et al., are very different than the

rhodium salts disclosed by Applicant. Applicant discloses rhodium salts of the formula $M_z[Rh(NH_3)_x(NO_2)_{(6-x)}](NO_2)_y$ wherein $x=0$ to 6 , $y\geq 0$, $z\geq 0$ and M comprises an alkali metal or NH_4^+ cation, the cation preferably comprising sodium, potassium or ammonium NH_4^+ . Also disclosed is triaminetris(nitrito-N,N,N)rhodium(III), or $Rh(NH_3)_3(NO_2)_3$, and diammonium sodium hexanitrorhodate (III), or $(NH_4)_2Na[Rh(NO_2)_6]$. The rhodium salts disclosed by Rhoda et al. are ammonium rhodium III chloride $[(NH_4)_3RhCl_6]$ rhodium III nitrate $[Rh(NO_3)_3]$, diammonium sodium rhodium III chloride $[(NH_4)_2NaRhCl_6]$ and ammonium rhodium III nitrite $[(NH_4)_3Rh(NO_2)_6]$.

Rhoda et al. do not disclose platinum salts within the scope of the invention, as noted by the Examiner. The reference broadly discloses alkaline platinum IV hydroxide solutions, and only specifically discloses sodium platinum IV hydroxide $[Na_2Pt(OH)_6]$. These compounds are not within the scope of water soluble platinum nitrite salts or platinum amine-nitrite salts as disclosed by Applicant. Specifically, Applicant discloses platinum nitrite salts or platinum amine-nitrite salts having the formula $M_z[Pt(NH_3)_x(NO_2)_{(4-x)}](NO_2)_y$ wherein $x=0$ to 4 , $y\geq 0$, $z\geq 0$ and M comprises an alkali metal or NH_4^+ cation. The cation is preferably sodium, potassium or ammonium NH_4^+ . The preferred platinum compound disclosed is diaminebis(nitrito-N,N)platinum (II), or $Pt(NH_3)_2(NO_2)_2$, sometimes referred to as diaminedinitroplatinum, or P-salt, or diamineplatinum (II) nitrite; also existing as cis- and trans-isomers, both of which may be employed. None of the platinum compounds disclosed in the reference correspond to those specifically disclosed by Applicant, nor do they fall within the above formula. For these reasons, it is requested that the rejection be withdrawn.

With regard to claim 26, in order to sustain a rejection for lack of novelty under 35 U.S.C. 102, the Examiner has the burden to show that every element of the claimed invention is disclosed in a single reference. This burden has not been satisfied. Claim 26 relates to an article comprising a substrate immersed in an aqueous solution which solution comprises a water soluble, platinum nitrite salt or platinum amine-nitrite salt; a water soluble rhodium nitrite salt or rhodium amine-nitrite salt; ammonium hydroxide as a complexing agent; and hydrazine hydrate as a reducing agent. This composition is not taught or disclosed by Rhoda et al. Also, claim 26 does not relate

to an article produced by the claimed plating bath, but only to a substrate immersed in the claimed solution. Rhoda et al. fail to disclose the incorporation of either the claimed rhodium salts or the claimed platinum salts. In order for claim 26 to be anticipated by Rhoda et al., the Examiner has the burden to show that the applied reference teaches a bath having each of the required elements of the claimed bath. This burden cannot be satisfied. For these reasons, it is requested that the rejection be withdrawn.

The Examiner has also rejected claims 1-2, 4, 7, 9-21, 23 and 25 under 35 U.S.C. 103(a) over Rhoda et al. in view of Chang et al. Rhoda et al. is discussed above. The Examiner has applied Chang et al. to show the use of platinum as a platinum nitrite or amine-nitrite salt. Chang et al. disclose an electroless plating bath for plating spark plug tips with platinum, wherein the bath comprises a solution of platinum diamine dinitrite, hydrazine hydrate and ammonium hydroxide. However, while Chang et al. discloses the use of a platinum diamine dinitrite, there is no teaching or suggestion in the art to combine the platinum diamine dinitrite with a rhodium salt to form a electroless plating bath. More particularly, there is no teaching or suggestion to combine their a platinum diamine dinitrite with a rhodium nitrite salt or rhodium amine-nitrite salt in solution with hydrazine hydrate and ammonium hydroxide to form a composition suitable to plate a platinum-rhodium alloy onto a substrate. Further, while there is no motivation in the art to combine these references to achieve the results of the claimed invention, it is not conclusive that a combination of the teachings of these references would form a *compatible* solution having the stability of the presently claimed composition.

The claimed plating composition is more stable than prior art solutions, generates essentially no hazardous substances and the absence of non-volatile components avoids the accumulation of byproducts that degrade the plating bath, allowing for virtually unlimited replenishment of the bath, and is essentially free of sulfur, phosphorus, chlorine and non-volatile components that cause impure plating, allowing for improved appearance and properties of the plated alloy. Moreover, the composition of the plating bath allows metallic rhodium and platinum to be precipitated from the plating bath by boiling without undesirable contaminants. For these reasons, it is submitted that the claimed invention is would not be obvious to one skilled in the

prior art upon a reading of Rhoda et al. and Chang et al., and it is requested that the rejection be withdrawn.

The Examiner has merely shown one reference disclosing different rhodium salts than those disclosed by Applicant and different platinum salts, and another reference disclosing only platinum diamine dinitrite. However, there is no suggestion from either reference that one should combine the two references in order to achieve the inventive composition having the described benefits.

Further, it is respectfully submitted that the Examiner is employing an incorrect legal standard for patentability. The belief that one skilled in the art **could** form the claimed plating bath does not suggest that one **should** form such a film to obtain the disclosed benefits. It is therefore requested that the rejection be withdrawn.

The Examiner has rejected claim 3 under 35 U.S.C. 103(a) over Rhoda et al. and Chang et al. as applied above, and further in view of JP 58204168. Rhoda et al. and Chang et al. have been discussed above. JP 58204168 discloses an electroless plating bath of rhodium and rhodium alloys. The bath comprises a rhodium salt having the formula $[Rh(NH_3)_6]X_3$, wherein X is a halogen, NO_2 , etc., a hydrazine reducer, an hydroxyl amine salt, and optionally a platinum salt. The rhodium salts disclosed by the reference do not correspond to those disclosed by Applicant. Applicant discloses a composition including a rhodium nitrite salt or rhodium ammine-nitrite salt having the formula $M_z[Rh(NH_3)_x(NO_2)_{(6-x)}](NO_2)_y$ wherein $x=0$ to 6, $y \geq 0$, $z \geq 0$ and M comprises an alkali metal or NH_4^+ cation. The closest scenario would be when $X=NO_2$ using the formula $[Rh(NH_3)_6]X_3$ from the reference, the resulting rhodium salt being $[Rh(NH_3)_6](NO_2)_3$, while in Applicant's formula, substituting $x=6$ and $y=2$, the resulting formula being $M_z[Rh(NH_3)_6](NO_2)_2$, wherein M comprises an alkali metal or NH_4^+ cation. These two formulas are very different because the reference excludes the alkali metal or NH_4^+ cation required by Applicant's formula. Further, there is no motivation in the art to combine the references to achieve the results of the claimed invention. The applied reference does not teach or suggest combining rhodium salts with a water soluble platinum nitrite salt or platinum amine-

nitrite salt to form a composition as in the present invention. Rather, in the Example of Application 4, the reference only specifically discloses using a Platinum-Rhodium mixed amine complex salt.

When selective combination of prior art references is needed to make an invention seem obvious, there must be something in the art to suggest that particular combination other than hindsight gleaned from the invention itself, something to suggest the desirability of the combination. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 5 U.S.P.Q.2d 1434, 1438 (CAFC 1988). Such a suggestion is absent in the cited references. For these reasons, and in light of the arguments above regarding Rhoda et al. and Chang et al., it is requested that this rejection be withdrawn.

The Examiner has also rejected claim 22 under 35 U.S.C. 103(a) over Rhoda et al. and Chang et al. as applied to Claim 11 above, and further in view of Ishihara et al. It is respectfully asserted that this ground of rejection has been overcome by the instant amendment. Claim 11 has been amended to correct a typographical error, specifying that the substrate is plated from a plating solution having the claimed composition of the invention. Rhoda et al. and Chang et al. have been discussed above. Ishihara et al. discloses a conductive film circuit formed on an insulator substrate or semiconductor substrate whereby a metal or metal alloy, including a platinum-rhodium, alloy is deposited onto the substrate by coating or sputtering and then subsequently etched. It is respectfully submitted that this reference is not applicable to the present invention in that it does not relate to electroless plating of a substrate. The reference does not teach or suggest that semiconductor substrates are suitable for electroless plating techniques, nor electroless plating techniques as described by the present invention. Absent such a teaching or suggestion, the claim cannot be obvious in view of the applied references. For these reasons it is requested that the rejection be withdrawn.

No matter how one applies or combines these references they do not teach the composition of the electroless plating bath of the claimed invention to attained the demonstrated benefits. An invention cannot be deemed unpatentable merely because, in a hindsight attempt to reconstruct the invention, one can find elements of it in the art; it must be shown that the invention as a

whole was obvious at the time the invention was made without knowledge of the claimed invention. It is submitted that the examiner is reconstructing the art in light of Appellant's disclosure. Where Appellants' teachings are needed to find the invention, the invention is not obvious. Obviousness cannot be determined solely after reading Appellants' teaching. Citing references that merely indicate that isolated parts recited in the claims are known is not a sufficient basis for a conclusion of obviousness; there must be something that suggests the desirability of combining the references in a manner calculated to arrive at the claimed invention. *Ex parte Hiyamizu*, 10 U.S.P.Q.2d 1393, 1394 (PTO Bd. Pat. Ap. and Int., 1988). For these reasons it is requested that the rejections be withdrawn.

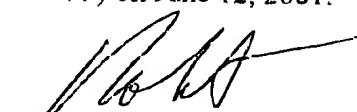
The undersigned respectfully requests re-examination of this application and believes it is now in condition for allowance. Such action is requested. If the examiner believes there is any matter which prevents allowance of the present application, it is requested that the undersigned be contacted to arrange for an interview which may expedite prosecution.

Respectfully submitted,



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I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office (FAX No. 703-305-3599) on June 12, 2001.



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